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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/757,751	01/14/2004	Qiao Li	SP03-009	4269

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CORNING INCORPORATED
SP-TI-3-1
CORNING, NY 14831

EXAMINER

SONG, MATTHEW J

ART UNIT	PAPER NUMBER
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1722

DATE MAILED: 04/20/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/757,751

Applicant(s)

LI ET AL.

Examiner

Matthew J. Song

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 February 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5, 7-12 is/are pending in the application.
- 4a) Of the above claim(s) 10-12 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5 and 7-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 1 recites, "a cooling rate of 3°C or less" in line 12. A rate requires a time component, such as °C/hr or °C/min, which claim 1 lacks; therefore is indefinite.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1-5 and 7-9 rejected under 35 U.S.C. 103(a) as being unpatentable over Herve et al (WO 01/73168 A1) in view of Obara et al (WO 02/077676), where US 6,850,371 is used as an accurate translation, or Sakuma et al (US 2002/0038625 A1).

In a method of growing CaF_2 single crystals, note entire reference, Herve et al teaches a first (melting) chamber surmounts a second (annealing) chamber and the thermal conditions in each of the melting and annealing chambers and the resulting thermal gradient are those which are necessary to obtain the expected effect of formation and growth of single crystals inside the crucibles (pg 4). Herve et al also teaches a powdered material inside the crucibles is melted in the upper melting zone and the molten material then cools on passing from the melting zone to the annealing zone (pg 10) and growing CaF_2 , BaF_2 , MgF_2 and optical fluoride crystals (pgs 1 and 3), this reads on applicant's heating a fluoride to greater than its melting temperature to form a melt and growing a crystal by cooling the melt from a melting temperature to a first temperature below the melting temperature. Herve et al also teaches the temperature for the melting chamber is greater than 1525°C and the temperature for the annealing chamber is less than 1525°C (pg 13).

Herve et al does not teach the temperature difference between the two zones is less than 50°C during crystal formation. Herve et al also teaches the temperature for the melting chamber is greater than 1525°C and the temperature for the annealing chamber is less than 1525°C (pg 13). A temperature difference of greater than 2°C would have been obvious to a person of ordinary skill in the art since the temperature of melting chamber can be 1526°C and the temperature of the annealing chamber can be 1524°C . It would have been obvious to a person of

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ordinary skill in the art at the time of the invention to modify Herve et al by using a temperature difference of less than 50°C because overlapping ranges are held to be obvious and changes in temperature are held to be obvious (MPEP 2144.05).

Herve et al does not teach annealing the crystal in the cooling zone by cooling the crystal from the first temperature to a final temperature at a substantially constant cooling rate of 3°C or less. The Examiner has interpreted a rate 3°C or less to mean 3°C/hr or less.

In a method of making fluoride crystalline members, note entire reference, Obara et al teaches after the temperature of the fluoride crystal has reached 900°C, it is possible to continue slow cooling with the same temperature decreasing rate, this reads on applicant's substantially constant cooling rate, and the temperature decreasing rate from 900°C to 750°C is set in a range of 0.1 to 5°C/hr and the temperature decreasing rate from 750°C down to completion is set in a range 1.0 to 15°C/hr ('371 col 11, ln 11-67), overlapping ranges are held to be obvious (MPEP 2144.05). Obara et al also teaches by slow cooling, it is possible to enhance the effect of preventing development of cracks and deterioration of homogeneity in the refractive index as well ('371 col 11, ln 15-35). Obara et al also teaches crystallization is normally complete at 1200-1350°C and cooling down at a rate of 1-15°C/hr (col 10, ln 20 to col 11, ln 15). Obara et al also teaches cooling to room temperature (col 14, ln 45-60).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Herve et al by using the cooling rate taught by Obara et al to enhance the effect of preventing development of cracks and deterioration of homogeneity in the refractive index.

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In a method of manufacturing calcium fluoride, note entire reference, Sakuma et al teaches a cooling process in order to improve the optical properties of the single crystal of calcium fluoride. Sakuma et al also teaches the slower the cooling speed, the greater the effect of the improvement on the optical properties and the cooling speed from a maximum temperature to room temperature is set to be 2°C/hr or less ([0051]-[0059]), this reads on applicant's substantially constant cooling rate. Overlapping ranges are held to be obvious (MPEP 2144.05). Sakuma et al teaches a maximum temperature for annealing is between 1020-1150°C ([0052]-[0056]).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Herve et al by using the cooling rate taught by Sakuma et al to improve the optical properties of the fluoride crystal.

Referring to claim 3, the combination of Herve et al and Sakuma et al or the combination of Herve et al and Obara et al teaches 1020-1150°C ('625 [0053]) and 1200-1350°C ('371 col 10, ln 35-50). Overlapping ranges are held to be obvious (MPEP 2144.05).

Referring to claim 7, the combination of Herve et al and Sakuma et al or the combination of Herve et al and Obara et al is silent to applying a decreasingly fast cooling profile to the first zone and an increasing layer slow cooling profile to the second zone. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Herve et al and Sakuma et al or the combination of Herve et al and Obara et al by controlling the cooling to obtain an annealing temperature after growth of the crystal, as claimed, because the first zone is at a higher temperature than the second zone.

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Referring to claims 8-9, the combination of Herve et al and Sakuma et al or the combination of Herve et al and Obara et al is silent to the claimed optical properties for average homogeneity and birefringence, however these properties would be inherent to the calcium fluoride crystal taught by the combination of Herve et al and Sakuma et al or the combination of Herve et al and Obara et al because the combination of Herve et al and Sakuma et al or the combination of Herve et al and Obara et al teaches a similar method of crystal growth and annealing. Furthermore, the combination of Herve et al and Sakuma et al or the combination of Herve et al and Obara et al teaches a cooling rate of less than 2°C/hr and applicants' teach the claimed properties are obtained by using a cooling rate of less than about 3°C/hr (pg 6 [0021] of the instant specification).

5. Claims 1-5 and 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Price (US 2002/0066402 A1) in view of Obara et al (WO 02/077676), where US 6,850,371 is used as an accurate translation, or Sakuma et al (US 2002/0038625 A1).

In a method of manufacturing a fluoride crystal, note entire reference, Price teaches heating a fluoride raw material to a temperature sufficient to maintain the fluoride raw material in a molten condition in a melting chamber 12 (claim 1 and [0038]). Price also teaches an annealing chamber 4, which is maintained at a temperature lower than the temperature of the melting chamber 12 ([0038]), this reads on applicant's cooling zone. Price also teaches applying a crystal growth thermal gradient comprising translating from the first zone of the furnace to a second zone of the furnace that is maintained at a temperature lower than the temperature of the first zone of the furnace (claim 3). Price also teaches applying the thermal gradient to form the

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crystal comprises decreasing the temperature in a manner that allows a desired thermal gradient to be sustained within the crystal growth chambers (claim 11). Price also teaches CaF_2 , BaF_2 , SrF_2 , LiF , MgF_2 and NaF fluoride crystals ([0001]-[0003]).

Price does not teach annealing the crystal in the cooling zone by cooling the crystal from the first temperature to a final temperature at a substantially constant cooling rate of 3°C or less. The Examiner has interpreted a rate 3°C or less to mean 3°C/hr or less.

In a method of making fluoride crystalline members, note entire reference, Obara et al teaches after the temperature of the fluoride crystal has reached 900°C , it is possible to continue slow cooling with the same temperature decreasing rate, this reads on applicant's substantially constant cooling rate, and the temperature decreasing rate from 900°C to 750°C is set in a range of 0.1 to 5°C/hr and the temperature decreasing rate from 750°C down to completion is set in a range 1.0 to 15°C/hr ('371 col 11, ln 11-67), overlapping ranges are held to be obvious (MPEP 2144.05). Obara et al also teaches by slow cooling, it is possible to enhance the effect of preventing development of cracks and deterioration of homogeneity in the refractive index as well ('371 col 11, ln 15-35). Obara et al also teaches crystallization is normally complete at 1200 - 1350°C and cooling down at a rate of 1 - 15°C/hr (col 10, ln 20 to col 11, ln 15). Obara et al also teaches cooling to room temperature (col 14, ln 45-60).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Price by using the cooling rate taught by Obara et al to enhance the effect of preventing development of cracks and deterioration of homogeneity in the refractive index.

In a method of manufacturing calcium fluoride, note entire reference, Sakuma et al teaches a cooling process in order to improve the optical properties of the single crystal of

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calcium fluoride. Sakuma et al also teaches the slower the cooling speed, the greater the effect of the improvement on the optical properties and the cooling speed from a maximum temperature to room temperature is set to be 2°C/hr or less ([0051]-[0059]), this reads on applicant's substantially constant cooling rate. Overlapping ranges are held to be obvious (MPEP 2144.05). Sakuma et al teaches a maximum temperature for annealing is between 1020-1150°C ([0052]-[0056]).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Price by using the cooling rate taught by Sakuma et al to improve the optical properties of the fluoride crystal.

The combination of Price and Obara et al or the combination of Price and Sakuma et al teaches the melting chamber is heated to a temperature sufficient to melt the crystal raw material and the annealing chamber is maintained at a temperature lower than the temperature of the melting chamber ('402 [0038]). The combination of Price and Obara et al or the combination of Price and Sakuma et al does not teach a temperature difference between the two zones is less than 50°C. Temperature is well known in the art to be a result effective variable. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Price and Obara et al or the combination of Price and Sakuma et al by optimizing the temperature of the melting chamber and annealing chamber to obtain the claimed temperature difference by conducting routine experimentation (MPEP 2144.05).

Referring to claim 7, the combination of Price and Obara et al or the combination of Price and Sakuma et al is silent to applying a decreasingly fast cooling profile to the first zone and an increasing layer slow cooling profile to the second zone. It would have been obvious to a person

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of ordinary skill in the art at the time of the invention to modify the combination of Price and Obara et al or the combination of Price and Sakuma et al by controlling the cooling to obtain an annealing temperature after growth of the crystal, as claimed, because the first zone is at a higher temperature than the second zone.

Referring to claims 8-9, the combination of Price and Obara et al or the combination of Price and Sakuma et al is silent to the claimed optical properties for average homogeneity and birefringence, however these properties would be inherent to the calcium fluoride crystal taught by the combination of Price and Obara et al or the combination of Price and Sakuma et al et al because the combination of Price and Obara et al or the combination of Price and Sakuma et al teaches a similar method of crystal growth and annealing. Furthermore, the combination of Price and Obara et al or the combination of Price and Sakuma et al teaches a cooling rate of less than 2°C/hr and applicants' teach the claimed properties are obtained by using a cooling rate of less than about 3°C/hr (pg 6 [0021] of the instant specification).

6. Claims 1-5 and 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lo Iacono (US 6,620,347) in view of Shiozawa (US 2001/0019453 A1) and further in view of Obara et al (WO 02/077676), where US 6,850,371 is used as an accurate translation, or Sakuma et al (US 2002/0038625 A1).

In a method of fluoride crystal growth, note entire reference, Lo Iacono teaches a Bridgman crystal growth method comprising placing a crucible in a furnace to melt a growth mixture in a crucible. Lo Iacono also teaches a temperature gradient is formed across the crucible either by lowering the crucible out of a hot side of a furnace to a cooler side of the furnace and a

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crystal forms as the melt cools (col 6, ln 30-67). Lo Iacono also teaches a temperature gradient between about 1-20°C per centimeter can be formed in a two zone vacuum furnace (col 7, ln 1-67). Lo Iacono also teaches a single crystal of CaF_2 , BaF_2 , SrF_2 , MgF_2 , ZnF_2 and CdF_2 (col 3, ln 1-25).

Lo Iacono does not teach a temperature difference of less than 50°C.

In a method of making fluoride crystals, note entire reference, Shiozawa teaches a vertical Bridgeman method for crystal growth comprising two heater elements were provided above and below a solid-melt interface to control the temperature gradient at the solid-melt interface. Shiozawa also teaches at the interface, the temperatures of the heater elements were measured and the distance between the measurement locations was set to 10 cm. Shiozawa also teaches the temperature gradient can be determined to be 5°C/cm, if the temperature difference of the top and bottom heater elements was 50°C. Shiozawa also teaches crystallization was carried out by a pulling down scheme from the high temperature zone to the low temperature zone ([0070]-[0076]).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Lo Iacono by using the Bridgeman furnace with a distance 10 cm between the two heaters taught by Shiozawa because the spacing is conventionally known in the art to be used in Bridgeman furnaces.

Referring to claim 1, the combination of Lo Iacono and Shiozawa teach a temperature gradient of 1-20°C/cm and a spacing of 10 cm, which requires a temperature difference of 10-200°C. Overlapping ranges are held to be obvious (MPEP 2144.05).

The combination of Lo Iacono and Shiozawa does not teach annealing the crystal in the cooling zone by cooling the crystal from the first temperature to a final temperature at a substantially constant cooling rate of 3°C or less. The Examiner has interpreted a rate 3°C or less to mean 3°C/hr or less.

In a method of making fluoride crystalline members, note entire reference, Obara et al teaches after the temperature of the fluoride crystal has reached 900°C , it is possible to continue slow cooling with the same temperature decreasing rate, this reads on applicant's substantially constant cooling rate, and the temperature decreasing rate from 900°C to 750°C is set in a range of 0.1 to 5°C/hr and the temperature decreasing rate from 750°C down to completion is set in a range 1.0 to 15°C/hr ('371 col 11, ln 11-67), overlapping ranges are held to be obvious (MPEP 2144.05). Obara et al also teaches by slow cooling, it is possible to enhance the effect of preventing development of cracks and deterioration of homogeneity in the refractive index as well ('371 col 11, ln 15-35). Obara et al also teaches crystallization is normally complete at 1200 - 1350°C and cooling down at a rate of 1 - 15°C/hr (col 10, ln 20 to col 11, ln 15). Obara et al also teaches cooling to room temperature (col 14, ln 45-60).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Lo Iacono and Shiozawa by using the cooling rate taught by Obara et al to enhance the effect of preventing development of cracks and deterioration of homogeneity in the refractive index.

In a method of manufacturing calcium fluoride, note entire reference, Sakuma et al teaches a cooling process in order to improve the optical properties of the single crystal of calcium fluoride. Sakuma et al also teaches the slower the cooling speed, the greater the effect of

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the improvement on the optical properties and the cooling speed from a maximum temperature to room temperature is set to be 2°C/hr or less ([0051]-[0059]), this reads on applicant's substantially constant cooling rate. Overlapping ranges are held to be obvious (MPEP 2144.05). Sakuma et al teaches a maximum temperature for annealing is between 1020-1150°C ([0052]-[0056]).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Lo Iacono and Shiozawa by using the cooling rate taught by Sakuma et al to improve the optical properties of the fluoride crystal.

Referring to claim 7, the combination of Lo Iacono, Shiozawa and Obara et al or the combination of Lo Iacono, Shiozawa and Sakuma et al is silent to applying a decreasingly fast cooling profile to the first zone and an increasing layer slow cooling profile to the second zone. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Lo Iacono, Shiozawa and Obara et al or the combination of Lo Iacono, Shiozawa and Sakuma et al by controlling the cooling to obtain an annealing temperature after growth of the crystal, as claimed, because the first zone is at a higher temperature than the second zone.

Referring to claims 8-9, the combination of Lo Iacono, Shiozawa and Obara et al or the combination of Lo Iacono, Shiozawa and Sakuma et al is silent to the claimed optical properties for average homogeneity and birefringence, however these properties would be inherent to the calcium fluoride crystal taught by the combination of Lo Iacono, Shiozawa and Obara et al or the combination of Lo Iacono, Shiozawa and Sakuma et al because the combination of Lo Iacono, Shiozawa and Obara et al or the combination of Lo Iacono, Shiozawa and Sakuma et al teaches a

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similar method of crystal growth and annealing. Furthermore, the combination of Lo Iacono, Shiozawa and Obara et al or the combination of Lo Iacono, Shiozawa and Sakuma et al teaches a cooling rate of less than 2°C/hr and applicants' teach the claimed properties are obtained by using a cooling rate of less than about 3°C/hr (pg 6 [0021] of the instant specification).

Double Patenting

7. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

8. Claims 1-5 and 7-9 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-22 of copending Application No. 10/652,013 in view of Shiozawa (US 2001/0019453 A1). Although the conflicting claims are not identical, they are not patentably distinct from each other because 10/652,013 claims a method of making a calcium fluoride crystal comprising heating a calcium fluoride feedstock to a temperature sufficient to form a melt and growing a calcium fluoride crystal through a temperature gradient zone having an axial temperature gradient of 2-8°C/cm (claims 1-5), this reads on applicants' controlling the temperature of the two zones so that

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temperature difference between the two zones is minimized during crystal formation because the gradient is small and requires temperature control of both zones. 10/652,013 also claims a first and second zone in a vertical zone, the first zone is used to heat the feedstock and the second zone is used to anneal the crystal (claim 9-12). 10/652,013 also claims the first temperature is in a range of 1300-1100°C (claim 13). 10/652,013 also claims cooling to final temperature between 300-20°C at a rate of 2°C/hr or less (claims 14-18). 10/652,013 also claims a slow cooling profile and a fast cooling profile (claim 19). 10/652,013 also claimed the birefringence is no greater than 1.2 nm/cm and an inhomogeneity no greater than 1.1 ppm (claim 8).

10/652,013 does not claim a temperature difference between the two zones is less than 50°C.

In a method of making fluoride crystals, note entire reference, Shiozawa teaches a vertical Bridgeman method for crystal growth comprising two heater elements were provided above and below a solid-melt interface to control the temperature gradient at the solid-melt interface. Shiozawa also teaches at the interface, the temperatures of the heater elements were measured and the distance between the measurement locations was set to 10 cm. Shiozawa also teaches the temperature gradient can be determined to be 5°C/cm, if the temperature difference of the top and bottom heater elements was 50°C. Shiozawa also teaches crystallization was carried out by a pulling down scheme from the high temperature zone to the low temperature zone ([0070]-[0076]).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify 10/652,013 by using the Bridgeman furnace with a distance 10 cm between

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the two heaters taught by Shiozawa because the spacing is conventionally known in the art to be used in Bridgeman furnaces.

Referring to claim 1, the 10/652,013 and Shiozawa teaches a temperature gradient of 2-8°C/cm and a spacing of 10 cm, which requires a temperature difference of 20-80°C.

Overlapping ranges are held to be obvious (MPEP 2144.05).

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Response to Arguments

9. Applicant's arguments, see page 6-7 of the remarks, filed 2/2/2005, with respect to the 112 second paragraph rejection have been fully considered and are persuasive. The rejection of claim 4 has been withdrawn.

10. Applicant's arguments, see page 7 of the remarks, filed 2/2/2005, with respect to the 102 rejection in view of Garibin et al have been fully considered and are persuasive. The rejection of claims 1, 2, 3, 5 and 6 has been withdrawn.

11. Applicant's arguments, see page 8 of the remarks, filed 2/2/2005, with respect to the 103 rejection in view of Garibin et al and Sakuma et al have been fully considered and are persuasive. The rejection of claims 1-5 and 7-9 has been withdrawn.

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12. Applicant's arguments, see page 9 of the remarks, filed 2/2/2005, with respect to the 103 rejection in view of Price and Sakuma et al have been fully considered and are persuasive. The rejection of claims 1-5 and 7-9 has been withdrawn.

13. Applicant's arguments, see page 10 of the remarks, filed 2/2/2005, with respect to Shiozawa et al and Sakuma et al have been fully considered and are persuasive. The rejection of claims 1-5 and 7 has been withdrawn.

14. Applicant's arguments with respect to claims 1-5 and 7-9 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

15. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

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however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J. Song whose telephone number is 571-272-1468. The examiner can normally be reached on M-F 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on 571-272-1137. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MJS

Matthew J Song
Examiner
Art Unit 1722



ROBERT KUNEMUND
PRIMARY EXAMINER